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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,269	09/26/2003	Scott G. Walton	NC 83,217	8821

26384 7590 01/05/2007  
NAVAL RESEARCH LABORATORY  
ASSOCIATE COUNSEL (PATENTS)  
CODE 1008.2  
4555 OVERLOOK AVENUE, S.W.  
WASHINGTON, DC 20375-5320

EXAMINER
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BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/05/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/672,269	<b>Applicant(s)</b> WALTON ET AL.	
	<b>Examiner</b> Richard Bueker	<b>Art Unit</b> 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 17-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-19 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) (see Fig. 1), who discloses an electron beam plasma source comprising a process chamber containing halogen based gas, an electron source operable to provide an electron beam in the process chamber, and magnetic field means for confining the e-beam. Walton I teaches (page 987, para. Bridging cols. 1 and 2) that e-beam generated plasmas produce continuous ion-ion plasmas. Walton reports (page 989, last para.) that positive and negative ions can be extracted during all phases of plasma production. Therefore, the apparatus of Walton I is inherently an ion-ion plasma source that substantially comprises negative ions as recited. It is noted also that the limitations of claim 17, lines 7 and 8, and claim 19, lines 7 and 8 are process limitations that the apparatus of Walton is inherently capable of performing. Regarding the claim recitation of “the electron

Art Unit: 1763

beam having a current density of approximately  $.1 \text{ A/cm}^2$ ", it is noted that this is a process limitation that does not so limit the presently claimed apparatus. The claims as written do not require the presence of an electron beam of any particular density. The apparatus of Walton I does include "an electron source operable to provide an electron beam in the processing chamber" as recited in the claims, and this is the only apparatus structural feature relating to the electron beam that is required by the claims. It is noted also that the manner in which this limitation is phrased does not actually require the apparatus as claimed to be operable to produce electron beam having a current density of approximately  $0.1 \text{ A/cm}^2$ .

Also, regarding the claim 19 limitation of "an electron beam confiner operable to apply a magnetic field at approximately 200 G", Walton I at page 987, col. 2, lines 4-12, describes the use of a magnetic field of 150 G, which meets the claim 19 recitation of "approximately 200 G".

Claims 17-19 are rejected under 35 U.S.C. 103(a) as obvious over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) taken in view of Fernsler (Physics of Plasmas, vol. 5, No. 5, May 1998) or Meger (Physics of Plasmas, vol. 8, No. 5, May 2001). Walton I (see Fig. 1) discloses an electron beam plasma source comprising a process chamber containing halogen based gas, an electron source operable to provide an electron beam in the process chamber, and magnetic field means for confining the e-beam. Walton I teaches (page 987, para. Bridging cols. 1 and 2) that e-beam generated plasmas produce continuous ion-ion plasmas. Walton I reports (page 989, last para.) that positive and negative ions can be

Art Unit: 1763

extracted during all phases of plasma production. Therefore, the apparatus of Walton I is inherently an ion-ion plasma source that substantially comprises negative ions as recited. It is noted also that the limitations of claim 17, lines 7 and 8 and claim 19, lines 7 and 8 are process limitations that the apparatus of Walton I is inherently capable of performing.

Fernsler (Physics of Plasmas, vol. 5, No. 5, May 1998) or Meger (Physics of Plasmas, vol. 8, No. 5, May 2001). Fernsler (see pg. 2137, col. 2, last full sentence, for example) and Meger (pg. 2558, col. 1, lines 21 and 22, and page 2559, col. 2, last paragraph) both disclose apparatus comprising a processing chamber, an electron source operable to provide an electron beam in said processing chamber, and an electron beam confiner operable to generate a magnetic field at 200 G. If view of this teaching regarding the use of a magnetic field at 200 G to confine an electron beam of the type taught by Walton I, it would have been prima facie obvious to one skilled in the art to utilize the magnetic field means of Fernsler and Meger as the electron beam confiner in the Walton I apparatus because Fernsler and Meger teach that a magnetic field of 200 G will successfully confine an electron beam in the manner desired by Walton I. Regarding the recitation of "thereby maintaining a current density of said electron beam at approximately  $0.1 \text{ A/cm}^2$ ", Fernsler teaches the use of an electron current density of  $0.05 \text{ A/cm}^2$ , which is approximately  $0.1 \text{ A/cm}^2$ .

Applicants have argued that the current density value recited in the claims of  $0.1 \text{ A/cm}^2$  is orders of magnitude greater than that of Fernsler. It is noted, however, that the dictionary definition of "order of magnitude" is "a range of magnitude extending from

Art Unit: 1763

some value to ten times that value". Thus, "approximately  $0.1 \text{ A/cm}^2$ " is nowhere near to being an order of magnitude greater than the " $0.05 \text{ A/cm}^2$ " suggested by Fernsler. Also, the dictionary definition of "approximate" (see attached copy) includes "much like, resembling, more or less correct, to come near to, and approach". The value of " $0.05 \text{ A/cm}^2$ " suggested by Fernsler resembles or approaches the value of " $0.1 \text{ A/cm}^2$ " recited in the claims.

It is noted also that the only mention of current density in applicants' specification is at page 8, lines 20-22, where it recites that "the beam current density is typically  $0.1 \text{ A/cm}^2$  or less". The specification fails to provide any indication that this is a critical value. The specification also fails to provide any indication of how the beam current density is set or what process parameters determine the beam current density. It is noted that the cited references also disclose this same beam energy as that used by applicants (i.e. approximately 2000 eV), and the same magnetic field strength (i.e. approximately 200 G), and applicants specification does not explain what parameters other than these determine the current density.

Most importantly, it is noted that the claim recitation of "the electron beam having a current density of approximately  $.1 \text{ A/cm}^2$ " is a process limitation that does not so limit the presently claimed apparatus. Claims 17-19 as written do not require the presence of an electron beam of any particular density. The apparatus of Walton I does include "an electron source operable to provide an electron beam in the processing chamber" as recited in claims 17-19, and this is the only apparatus structural feature relating to the electron beam that is required by the claims. It is noted also that the manner in

Art Unit: 1763

which this limitation is phrased does not actually require the apparatus as claimed to be operable to produce electron beam having a current density of approximately 0.1 A/cm<sup>2</sup>.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

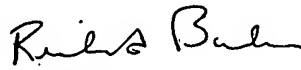
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Richard Bueker  
Primary Examiner  
Art Unit 1763